DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Interim Final 2/5/99
RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name:	Microsemi Consortium
Facility Address:	802 Hoyt Street, Broomfield, Colorado 80020
Facility EPA ID #:	COR000012443

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

X If yes - check here and continue with #2 below. **YES**
— If no - re-evaluate existing data, or
— if data are not available skip to #6 and enterAIN@ (more information needed) status code.
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BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	Yes			Volatile organic compounds (VOCs) at concentrations greater than the Colorado Groundwater Standards are known to exist in the shallow (alluvial deposits of the Arapahoe Formation) and deeper (upper portion of the Laramie Formation) groundwater beneath the site. The primary VOCs of concern are trichloroethene, chloroform and Freon-113).
Air (indoors)[2]		No		Based on the results of indoor air samples (analyzed in a fixed laboratory) from buildings directly over the groundwater contamination plume, there does not appear to be a significant human health risk.
Surface Soil (e.g., <2 ft)		No		The release of hazardous waste occurred from below grade sumps and tanks. Surface soil has not been impacted by the release.
Surface Water		No		The contaminant concentrations within the groundwater contamination plume where it intersects a stream/drainage ditch will not cause exceedences of human health protective levels within the surface water. This assumption was confirmed via the results of surface water samples collected in March 2003 from stormwater drainage channels downstream of the facility.
Sediment		No		The groundwater contamination plume does not intersect any surface water bodies so discharge to sediment does not occur.
Subsurf. Soil (e.g., >2 ft)	Yes			The release of hazardous waste occurred at the approximate elevation of the water table, but the remediation system currently operating will drawdown the water table leaving highly contaminated, non-saturated aquifer material that can be considered soil.
Air (outdoors)		No		Since the release of hazardous waste occurred from below grade sumps and tanks, it is unlikely that the concentration of hazardous constituents in the outdoor air at the facility would exceed human health risk-based levels.

X ___ If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

___ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Groundwater - The release of VOCs (primarily trichloroethene, chloroform and Freon-113) from the underground waste solvent tank along the south central site boundary at the Microsemi Consortium Facility has resulted in contamination of the shallow and deeper groundwater beneath the site at concentrations above State of Colorado Groundwater Standards.

References: 1) 2004 Annual Groundwater and Activities Summary Report dated January 17, 2005; and 2) Source Mass Investigation Summary Report dated September 19, 2002.

Air (indoors) - The indoor air sample results that support the conclusion that there does not appear to be a significant human health risk due to the release of hazardous waste at the facility are provided in a report titled "Indoor Air Sampling and Analysis in the Vicinity of Microsemi Facility (dated October 12, 2001).

Surface Soil and Subsurface Soil - The release of hazardous waste occurred from an underground storage tank and surface soil has not been impacted by the release. The subsurface soil/shallow aquifer material in the vicinity of the immediate vicinity of the release of hazardous waste is known to contain high concentrations of VOCs and is also contaminated with non-aqueous phase liquid.

References: 1) Source Mass Investigation Summary Report dated September 19, 2002.

Surface Water and Sediment - The concentration of trichloroethene in groundwater (3 to 20 ug/l) near where the contaminated groundwater plume intercepts a stream/storm drainage ditch downstream of the Microsemi Consortium Facility will dissipate rapidly once the groundwater discharge to the surface. Trichloroethylene was not detected in surface water samples collected at the location where the contaminated groundwater seeps into the stream/stormwater ditch.

References: 1) Supplemental Analysis, Surface Water and Monitoring Points TW-77 and TW-78 Report dated March 25, 2003; 2) Monitored Natural Attenuation Evaluation Plan for the Microsemi Facility (pages 9 and 10) dated March 2001; and 3). 2004 Annual Groundwater and Activities Summary Report dated January 17, 2005

Outdoor Air - Since the release of hazardous waste occurred from below grade sumps and tanks, it is unlikely that the concentration of hazardous constituents in the outdoor air at the facility would exceed human health risk-based levels. This conclusion is further supported by the results of outdoor air sampling at a building directly above the groundwater contamination plume in which there were no detections of groundwater contaminant plume related VOCs.

References: 1) Indoor Air Sampling and Analysis in the Vicinity of Microsemi Facility (dated October 12, 2001)

Footnotes:

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

AContaminated@ Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	No	No	No	No			No
~~Air (indoors)~~							
~~Soil (surface, e.g., <2 ft)~~							
Surface Water	No	No	No	No		No	No
~~Sediment~~							
Soil (subsurface e.g., >2 ft)	No	No	No	No			No
~~Air (outdoors)~~							

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors= spaces for Media which are not "contaminated" as identified in #2 above.
2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

X — If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

___ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

___ If unknown (for any AContaminated@ Media - Human Receptor combination) - skip to #6 and enter AIN@ status code.

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

Rationale and Reference(s):

Groundwater Receptors -

Residents - There is no complete pathway between the shallow or deep groundwater contamination and residents since there are no public or private water supply wells and no private residences that are located in, above or near the groundwater plume emanating from the Microsemi Consortium hazardous waste release

References: 1) On-Facility/Off-Facility Soil and Groundwater Investigation Work Plan (Section 1.3, Table 3, and Figure dated January 31, 1997; 2) Monitored Natural Attenuation Evaluation Plan for the Microsemi Facility (pages 9 and 10) dated March 2001.

Workers and Day-Care - There is no complete pathway between contaminated groundwater and workers or day-cares because the Microsemi Facility and surrounding businesses receive potable water from a municipal supply.

Construction - There is no complete pathway between contaminated groundwater and construction workers performing soil excavations since the depth to groundwater in the vicinity of the groundwater contamination plume emanating from the Microsemi Consortium hazardous waste release is approximately 15 feet, which is beneath the 12 foot depth typically considered in a construction worker exposure scenario.

References: Source Mass Investigation Summary Report dated September 19, 2002.

Food - There is no complete pathway between contamination present in the groundwater at the facility and human receptors via the food pathway since there are no activities conducted at the facility that would result in contamination of vegetables, fruits, crops, meat and dairy products, or shellfish.

Subsurface Soil Receptors -

Construction Worker - There is no complete pathway between contaminants in the subsurface soil and the construction worker since the depth to groundwater in the vicinity of the groundwater contamination plume emanating from the Microsemi Consortium hazardous waste release is approximately 15 feet, which is beneath the 12 foot depth typically considered in a construction worker exposure scenario.

References: 1) Source Mass Investigation Summary Report dated September 19, 2002.

Food - There is no complete pathway between contamination present in the surface soil and subsurface soil at the facility and human receptors via the food pathway since there are no activities conducted at the facility that would result in contamination of vegetables, fruits, crops, meat and dairy products, or shellfish.

Surface Water and Sediment Receptors - The concentration of trichloroethene in groundwater (3 to 20 ug/l) near where the contaminated groundwater plume intercepts a stream/storm drainage ditch downstream of the Microsemi Consortium Facility will dissipate rapidly once the groundwater discharge to the surface. Trichloroethylene was not detected in surface water samples collected at the location where the contaminated groundwater seeps into the stream/stormwater ditch.

References: 1) Supplemental Analysis, Surface Water and Monitoring Points TW-77 and TW-78 Report dated March 25, 2003; 2) Monitored Natural Attenuation Evaluation Plan for the Microsemi Facility (pages 9 and 10) dated March 2001; and 3). 2004 Annual Groundwater and Activities Summary Report dated January 17, 2005

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be "**significant**"[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

___ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

___ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

___ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s): Not Applicable

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

___ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

___ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

___ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s): Not Applicable

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

X YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Microsemi Consortium facility, EPA ID # COR000012443, located at 802 Hoyt Street, Broomfield, CO under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

___ NO - "Current Human Exposures" are NOT "Under Control."

___ IN - More information is needed to make a determination.

Completed by	(signature)	David Walker	Date	10/3/05
	(print)	David Walker		
	(title)	Environmental Protection Specialist		

Supervisor	(signature)		Date	10/4/05
	(print)	Walter Avramenko		
	(title)	Unit Leader, Hazardous Waste Corrective Action Unit		
	(EPA Region or State)	Colorado		

Locations where References may be found:
M&E Files for the Microsemi Consortium facility (COR000012442) and the Microsemi Corporation facility (COD078353901) Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division HMWMD-B2 4300 Cherry Creek Drive South Denver, CO 80246-1530

Contact telephone and e-mail numbers

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FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.